MULTIMEDIA UNIVERSITY

STUDENT IDENTIFICATION NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

T1, 2018/ 2019

BQA7074 - QUANTITATIVE ANALYSIS

(MBA Full Time)

5 OCTOBER 2018
9.00 a.m. – 12.00 p.m.
(3 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consist of **SEVEN (7)** pages (including the cover page).

2. Answer **ALL** questions. The marks distributions are given in parentheses.

3. Please write all your answers in the Answer Booklets provided.

QUESTION 1

Vollmer Manufacturing makes three components for sale to refrigeration companies. The components are processes on two machines: a shaper and a grinder. The times (in minutes) required on each machine are as follows:

	Machine	
Component	Shaper	Grinder
1	6	4
2	4	5
3	4	2

The shaper is available for 120 hours, and the grinder is available for 110 hours. No more than 200 units of component 3 can be sold, but up to 1000 units of each of the other components can be sold. In fact, the company already has orders for 600 units of component 1 that must be satisfied. The profit contributions for components 1, 2 and 3 are $8, $6 and $9, respectively.

a. Formulate and determine the recommended production quantities. **[8 marks]**

b. What are the objective coefficients ranges for the three components? Interpret these ranges for company management.

[4 marks]

c. What are the right-hand-side (RHS) ranges? Interpret these ranges for company management?

[4 marks]

d. If more time could be made available on the grinder, how much would it be worth?

[2 marks]

e. If more units of component 3 can be sold by reducing the sales price by $4, should the company reduce the price?

[2 marks]

[Total : 20 marks]

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QUESTION 2

The Orange Computer Company (OCC) manufactures one product, a dot-matrix printer, which is currently in short supply. Four of Orange's main outlets, large speciality computer shops at A,B,C and D, already have requirements which in total exceed the combined capacity of its three production plants are R, S, and T. The company needs to know how to allocate its production capacity to maximize profit.

Each printer is packed in a separate box after being carefully wrapped to prevent damage. Distribution cost ($) per unit from each production plant to each speciality shop are given in the following table.

From	To A ($)	To B ($)	To C ($)	To D ($)
R	22	24	22	30
S	24	20	18	28
T	26	20	26	24

Since the four speciality shops are in different parts of the country, and as there are differing transportation costs between the production plants and the speciality shops, along with slightly different production costs at each of the production plants, there is a pricing structure that enables different prices to be charged at the four shops. Currently, the price per unit charged is $230 at A, $235 at B, $225 at C and $240 at D. The variable unit production costs are $150 at plants R and T and $55 at plant S. The demands at A, B, C and D are 850, 640, 380 and 230 respectively. The plant capacity at R is 625, at S is 825 and at T is 450.

a. Formulate an initial tableau suitable for solving the transportation problem. **[8 marks]**

b. Solve the problem in (a) and advice OCC on the optimal production and shipment allocations: **[3 mark]**

c. What is your advice if OCC wishes to fulfil all the demand? **[4 marks]**

[Total : 15 marks]

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QUESTION 3

The Y2K textile mill was inspected by SOCSO found to be in violation of number of safety regulations. The SOCSO inspector ordered the management of Y2K mill to alter some of its existing machinery to make it safer, purchase some new machinery to replace the old, dangerous machinery, and relocate some machinery to make safer passages and unobstructed entrances and exist. SOCSO gave Y2K 30 days to make the changes; if the changes were not made by then, the mill would be fined by RM300, 000. The QA analyst hired by Y2K determined the activities in a PERT/CPM network that would have to be completed and estimated the activity as shown in the following table.

Activity	Description	Predecessor	Optimistic	Most likely	Pessimistic
A	Order new machinery	-	1	2	3
B	Plan new physical layout	-	2	5	8
C	Determine safety changes	-	1	3	5
D	Receive equipment	A	4	10	22
E	Hire new employees	A	4	8	12
F	Make alternations	B	10	15	26
G	Make changes on machinery	C	5	9	13
H	Train employees	D,E	2	3.5	8
I	Install new machinery	D,E,F	1	3	5
J	Relocate old machinery	D,E,F,G	2	4.5	10
K	Conduct safety orientation	H,I,J	2	2	2

a. Construct the project's network to show the relationship among the activities.

[5 marks]

b. Determine the critical path, project completion time and project variance.

[6 marks]

c. What is the effect on the project by delaying:

i. Activity B by 2 days **[2 marks]**
ii. Activity C by 1 day **[2 marks]**

[Total : 15 marks]

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QUESTION 4

The director of graduate studies at a large college of business would like to be able to predict the grade point index (GPI) of students in an MBA program based on the Graduate Management Aptitude Test (GMAT) score. A sample of 20 students who had completed 2 years in the program is selected; the results are as follows:

Observation	GMAT Score	GPI	Observation	GMAT Score	GPI
1	688	3.72	11	567	3.07
2	647	3.44	12	542	2.86
3	652	3.21	13	551	2.91
4	608	3.29	14	573	2.79
5	680	3.91	15	536	3.00
6	617	3.28	16	639	3.55
7	557	3.02	17	619	3.47
8	599	3.13	18	694	3.60
9	616	3.45	19	718	3.88
10	594	3.33	20	759	3.76

a. Obtain a linear multiple regression equation. **[4 marks]**

b. Interpret the coefficients in the regression equation obtained in (a) **[4 marks]**

c. Write and interpret the R-square value. **[4 marks]**

d. Perform the residual analysis and determine the adequacy of the model. **[4 marks]**

e. Use the regression equation developed in (a) to predict the GPI for a student with a GMAT score of 600. **[4 marks]**

[Total: 20 marks]

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QUESTION 5

Automobile insurance appraisers examine cars that have been involved in accidental collisions to assess the cost of repairs. An insurance executive is concerned that different appraisers produce significantly different assessments. In an experiment, 10 cars that have recently been involved in accidents were shown to two appraisers. Each assessed the estimated repair cost. The results are shown below.

Car	Appraiser 1	Appraiser 2
1	900	1400
2	360	380
3	640	600
4	1010	920
5	890	930
6	750	650
7	440	410
8	1210	1080
9	520	480
10	690	770

a. Can the insurance executive conclude that the appraisers differ significantly in their assessments? **[3 marks]**

b. Compute the 95% confidence interval of the population mean difference and interpret its meaning. **[3 marks]**

c. Test the necessary assumption for the test used in (a). Evaluate the validity of the findings done in (a). **[5 marks]**

d. Perform the appropriate test based on the results in (c). What is your conclusion? **[4 marks]**

[Total : 15 marks]

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QUESTION 6

Most college instructors prefer to have their students participate actively in class. Ideally, students should ask their professors questions and answer their professor's questions, making the classroom experience more interesting and useful. A statistics professor at a college in Kuala Lumpur believes that there are a number of external factors that affect student participation. He believes that the time of day and the configuration of seats are two such factors. Consequently, he organized the following experiment. Six classes of about 60 students each were scheduled for one semester. Two classes were scheduled at 9.00 a.m., two at 1.00 p.m. and two at 4.00 p.m. At each of three times, one of the classes was assigned to a room where the seats were arranged in rows of 10 seats. The other class was a U-shaped, tiered room, where students not only face the instructor, but face the fellow students as well. In each of the six classrooms, over 5 days, student participation was measured by counting the number of times students asked and answered questions. These data are displayed in the accompanying table.

Class Configuration	**Class Time**		
	9.00 a.m.	**1.00 p.m.**	**4.00 p.m.**
Rows	10	9	7
	7	12	12
	9	12	9
	6	14	15
	8	8	7
U-shape	15	4	7
	18	4	4
	11	7	9
	13	4	8
	13	6	7

a.) At the 5% significance level, is there statistical evidence of a significant interaction between the time and class configuration on student participation?

[4 Marks]

b.) At the 5% significance level, is there statistical evidence to indicate a significant effect of the time of class on student participation?

[4 Marks]

c.) At the 5% significance level, is there statistical evidence to indicate a significant effect of class configuration on student participation?

[4 Marks]

d.) Conduct the post-hoc tests if necessary and discuss the findings.

[3 Marks]

[Total: 15 marks]

End of Paper